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Environmental risk assessment and the environment agency

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Abstract

This paper explores the role of environmental risk assessment in environmental protection, as a tool to assist decision-making by both the environmental regulator and regulated industry, and as a means of supporting the relationship between the two parties. The use of risk assessment in process safety has been established over the last few decades, and is demonstrating benefit in many different applications. It is considered that similar benefits will also be found in environmental applications of risk assessment. Recent developments in environmental risk assessment within the Environment Agency will be described. The concepts of goal-setting and risk-based 'Safety Cases' have been introduced into safety legislation affecting offshore industry and certain onshore sectors such as rail transport. The further development of these concepts to include environmental legislation will be discussed, and the part which industry may play in this process considered. There are potential benefits to adopting a risk-based goal-setting approach to environmental protection, but there are also limitations in the application of risk assessment to the environment which need to be overcome. Whereas safety risk relates to the occurrence of accidents, environmental risk may arise from both accidents and routine operations, involving potentially long term processes and complex environmental behaviour. Both the benefits and limitations will be identified, and a 'way forward' outlined for progressing a risk-based approach to environmental protection.

Keywords: Environmental risk assessment; Environment agency; Environmental protection

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1. Introduction

The last 10 years have seen fundamental changes in the relationship between industry and environmental regulators. Before the introduction of the Environmental Protection Act 1990 [1], environmental regulation was performed by a number of inspectorates dedicated to particular environmental media and industry sectors. It was considered by some that this regime did not provide a sufficiently integrated approach to environmental protection, that inspectors and industry were too closely involved (the 'cosy relationship') and that inspectors' judgements were not sufficiently transparent to the public [2]. The Environmental Protection Act 1990 resulted in the formation of integrated inspectorates, a more transparent, objective system based on BATNEEC (Best Available Techniques Not Entailing Excessive Cost), BPEO (Best Practicable Environmental Option) and access to information via the public registers, and a new 'arms-length relationship' between industry and the environmental regulator. This has increased the need for assessment methods, regulatory systems and resources, and made decisions by inspectors and operators more open to review, sometimes resulting in difficulties between the two parties. The enactment of the Environment Act 1995 [3] has brought into being the new Environment Agency, and has extended the concept of integrated environmental protection to cover all functions of the old regulators, HMIP (Her Majesty's Inspectorate of Pollution), NRA (National Rivers Authority) and LWRA (Local Waste Regulatory Authorities). It has also emphasised the duty of the regulator to base decisions on sound science and information, to be open and transparent, and to have regard to the costs and benefits of all decisions and actions. A key issue for the Environment Agency is how to deliver the high expectations placed on it by government, industry and the public, and at the same time to reduce the costs of environmental protection and regulation wherever possible.

In this paper, the use of a risk-based goal-setting approach to environmental protection is proposed as a new model to enhance the relationship between environmental regulator and industry, one based on good science which attempts to strike a balance between the 'cosy relationship' and the 'arms-length relationship' of the past, combining the best aspects of both and helping the Agency and industry to meet the modern demands of environmental protection. Of course, this model is not entirely new, having already been practised in safety legislation as mentioned above. Furthermore, there are many elements of this model already in place in environmental protection. The intention of this paper is to point the way towards the new steps needed, and to stimulate discussion on these important topics. The Environment Agency would like to hear your views.

2. Recent developments in the environment agency on risk assessment

The Agency has responsibility for integrated protection and enhancement of the environment of England and Wales. The Agency's main objectives, as specified in the Environment Act 1995, are outlined in Appendix A.

In addition, statutory guidance to the Agency on sustainable development [4] requires the Agency to use sound, transparent science and information in developing a long-term and integrated perspective on environmental concerns. The Agency is developing a risk assessment programme to support this requirement. While there are substantial limitations to the current understanding and use of environmental risk assessment, the Agency has made significant advances and is already successfully using risk assessment in many activities. Several risk-related developments in the Agency are described below. Risk assessment is used in many aspects of the Agency's business, including in particular Flood Defence, Water Resources, Radioactive Substances and Contaminated Land. This paper focuses on the Pollution Control related developments in risk assessment.

2.1. Strategic risk assessment and policy appraisal

In the statutory guidance underpinning the Environment Act 1995, the Department of the Environment has set out a range of tools which it expects the Agency to use in working towards its principal aim of contributing towards sustainable development. Risk assessment, and economic and policy appraisal are amongst such tools. The Agency has sought to develop a Strategic Risk Assessment methodology to:

- compare the severity of risks from whatever sources;
- allocate resources to areas where the greatest level of risk reduction may be achieved;
- determine which policy option for any given scenario is likely to result in the greatest benefit.

The risks facing the environment may arise from sources as varied as atmospheric emissions from power stations, flooding of coastal areas, natural hot spots of radon, or leaks from nuclear power stations. In view of the variety of risks and likely consequences, the Strategic Risk Assessment methodology seeks to normalise such risks to make their intercomparison an easier process. The overall structure of the Strategic Risk Assessment methodology is shown in Fig. 1. It is based around four main modules which characterise the principal components of a risk assessment.

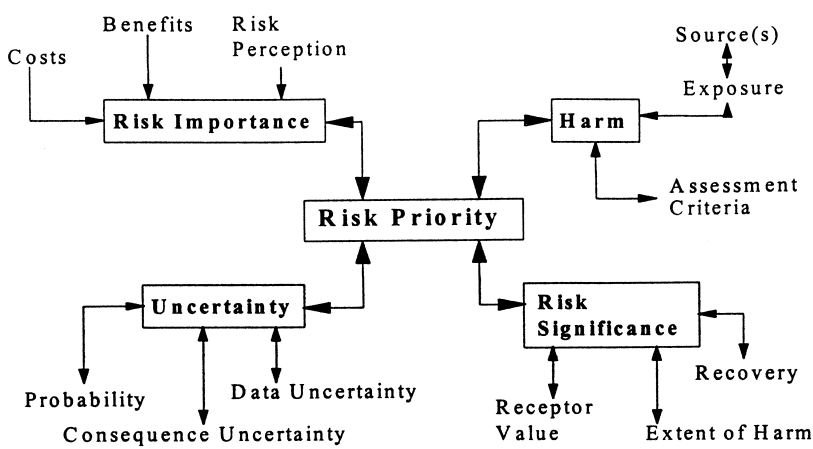

Fig. 1. Strategic risk assessment methodology.

- ***Harm***—where the consequences of exposure to a risk arising from a single or number of sources are determined for a pre-defined environmental receptor. This element of the risk assessment can be addressed through traditional risk/dispersion/impact models.
- ***Significance***—where the significance of the likely harm is characterised in relation to the scale over which the impacts will occur, the range of receptors that will be affected, and the ability of the environment to recover from the harm.
- ***Uncertainty***—where the probability of occurrence, the uncertainties associated with the data, and the lack of knowledge and information on the likely consequences are estimated.
- ***Importance***—where the less scientific elements required in determining the priority of a given risk are determined, e.g., public perceptions of the risk and its consequences, the costs and benefits of preventing the risks or mitigating its effects.

The Strategic Risk Assessment methodology should provide the Agency with a robust and consistent method for evaluating all risks on a common basis, taking all of the major factors into account. This will enable priorities to be set based on risk, and resources to be allocated in the most effective manner, across the entire range of risks of concern to the Agency. The Strategic Risk Assessment methodology can be used in policy appraisal, to evaluate the risks associated with different policy options, and thus meet the UK government requirement that new policy proposals be subject to risk assessment [5].

2.2. Risk-based work planning

The Agency is considering the use of risk-based techniques generally for targeting regulatory effort according to the level of risk, in order to maximise the effectiveness of available resources. For example, the OPRA (Operator and Pollution Risk Appraisal) system is being introduced to support inspection work planning for IPC (Integrated Pollution Control) processes [6].

OPRA is a simple risk screening technique for rating the overall environmental risk of an IPC process, based on its inherent risk of harm to the environment as a whole and the management systems applied by the operator to control that risk. The basic approach in OPRA is shown in Fig. 2: a PHA (Pollution Hazard Appraisal) is conducted to determine the inherent environmental risk from the process, and an OPA (Operator Performance Appraisal) is conducted to determine the operator's performance in managing that risk. PHA and OPA each contain seven attributes which are evaluated for each process and converted into ratings. The balance between the OPA and PHA ratings reflects the overall risk to the environment, which in turn determines the planned inspection effort for the process. OPRA will be used to rate all IPC processes according to their risk levels, and this information will then be used as a basis for planning IPC inspection effort. Further potential applications may be introduced once the system is established for work planning. The risk-based approach not only improves the efficiency of the Agency by targeting major risks, but also provides recognition and incentives for operators who improve their risk management. The Agency intends to use OPRA in an open and transparent manner with operators, to maximise its utility as a decision support tool.

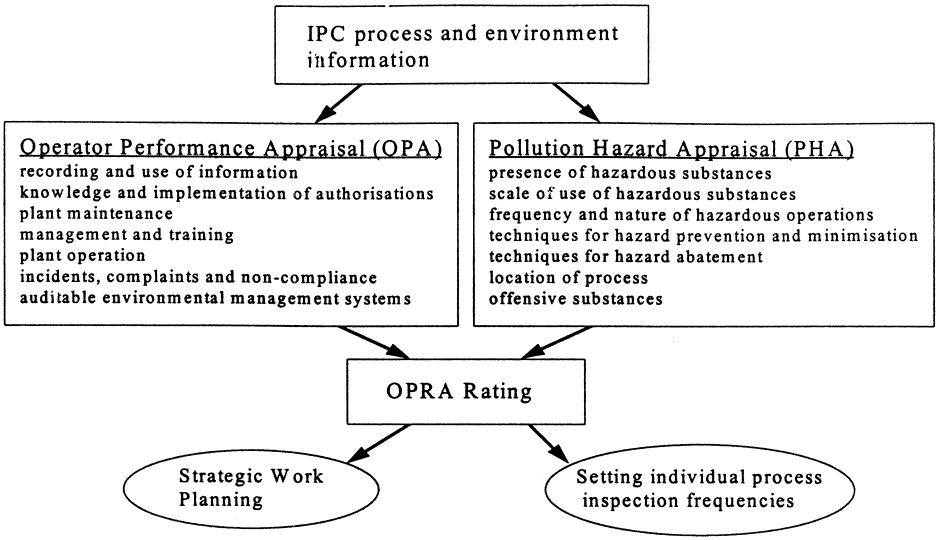

Fig. 2. Operator and pollution risk appraisal system.

The OPRA concept may be adapted to other pollution prevention and control functions of the Agency, such as waste and radioactive substances, so that regulatory resources are both divided between the different functions according to their overall risk levels, and targeted towards the high risks within each function. This is a crucial aspect of planning given the significant range of demands placed on the Agency and the need to carefully manage the use of Agency resources.

2.3. Risk acceptance criteria for harm to the environment

The Agency is reviewing all standards and criteria relating to pollution control, environmental protection and the delivery of levels of service across all of its functions, in order to establish a comprehensive strategy for setting and using these important parameters. In particular, a consistent basis is needed for setting criteria for harm to the environment from routine and non-routine releases from industrial processes, so that releases are controlled in proportion to their risks to the environment. However, the need for consistent criteria extends to all aspects of Agency business, e.g. natural risks, water supply levels, etc. As a specific example of work on criteria, the Department of Environment is working with the Environment Agency, Health and Safety Executive and industry representatives to provide guidance to industry and regulators on the assessment of risks to the environment. This includes the development of criteria for assessing the acceptability or perhaps ‘tolerability’ of risks of harm to the environment from non-routine releases, particularly major accidents. A possible set of risk acceptance criteria relating to the frequency of pollution incidents and their associated level of harm is shown in Fig. 3 below; these are preliminary criteria and may change as the project progresses. The methodology for calculating the level of harm uses an ‘Environmental

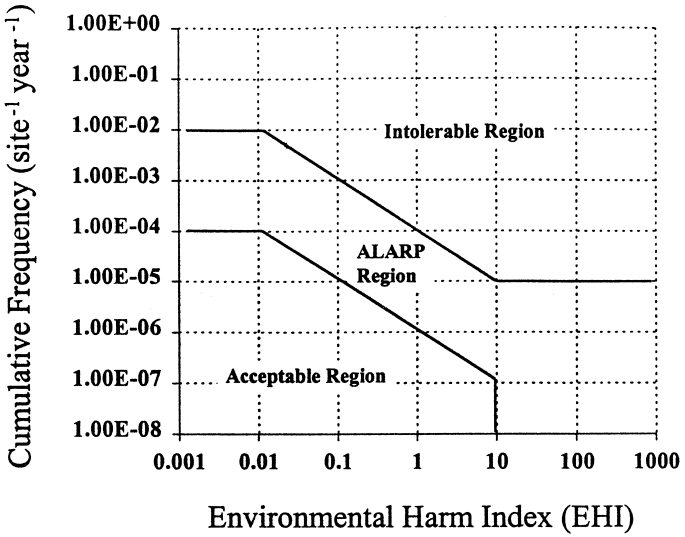

Fig. 3. Possible risk acceptance criteria for harm to the environment from pollution incidents.

Harm Index' (EHI) which is a dimensionless number relating to the size and severity of the incident, the duration of its effect on the environment, and other specific factors.

DTA (Direct Toxicity Assessment) is an example of how the Agency is developing new methods for assessing potential harm to the environment and setting environmental criteria accordingly. DTA is an Agency term for the use of toxicity tests to give a measure of effluent and environmental quality. A toxicity test is a procedure that measures the degree of effect on test organisms of a specific chemical, mixture of chemicals, effluent or environmental sample. DTA may provide early warning information prior to environmental damage (as picked up by biological survey, when environmental damage has already occurred—too late), and the net effect of numerous chemicals that, realistically, may not be monitored and controlled individually. The Environment Agency has been undertaking research and development to investigate the application of DTA to its business needs for several years. The following applications are under consideration.

- Water quality monitoring and the regulatory control of toxic discharges is currently based on the achievement of EQS (Environmental Quality Standards) in receiving waters. Discharge control would benefit from the inclusion of DTA since less than 0.1% of listed chemicals have an EQS, and EQSs do not take account of the effects of chemical mixtures or the nature of the specific receiving environment.
- Assessment of general quality may be another application of DTA. R&D (Research and Development) undertaking toxicity tests on environmental samples from estuarine and freshwater sites was completed in 1996. Early results from the work are indicating that DTA may be applied to provide a more complete picture of general quality of waters and sediments in the UK, and may be used to prioritise areas in the UK for DTA licences.

· The principles of DTA are transferable across environmental media. Future work will seek DTA application to land and air emissions.

2.4. Best practicable environmental option and integrated assessment of routine and accidental releases

The concept of an integrated method for assessing risks of harm to the environment from all types of release originates from the principle of BPEO developed by the Royal Commission on Environmental Pollution, where options for carrying out an activity (e.g. an industrial process or disposal of a waste) are compared in terms of both their overall environmental effects and costs, in order to determine the option which provides the best balance between cost and environmental effects. This concept is illustrated in the hypothetical example in Fig. 4. Each option may have several different environmental effects (e.g. different amounts or types of substance released to atmosphere or water, solid wastes, energy requirements, etc.). Therefore a method for adding and comparing different effects, i.e. an integrated approach, is needed. This ensures that releases of one form are not reduced simply at the expense of creating a problem for a different release or another part of the environment. The Agency has developed a specific methodology for assessing BPEO in the context of IPC processes [7], as required by the Environmental Protection Act 1990; however the concept of BPEO applies to a wide range of Agency responsibilities beyond pollution control. Integrated assessment of different types of environmental effect is inherently difficult due to the wide variety of damage mechanisms and environmental receptors, from local environmental quality issues to climate change concerns. Compared with risk assessments of public health and safety concerns, there is limited agreement on appropriate overall measures of environmental risks.

The IPC BPEO methodology provides a framework for integrated assessment of environmental effects from industrial processes (see Fig. 5). Methods have been developed for evaluating and adding up releases within specific categories of environmental harm; for example, the Integrated Environmental Index can be used to evaluate

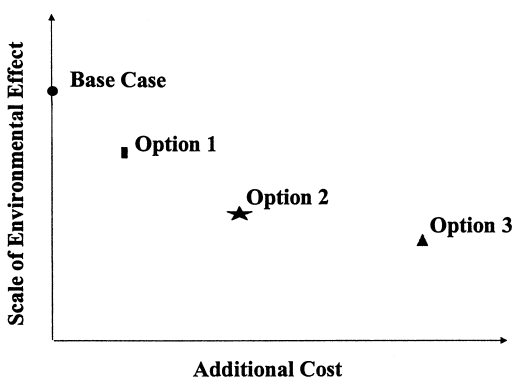

Fig. 4. Hypothetical BPEO assessment results.

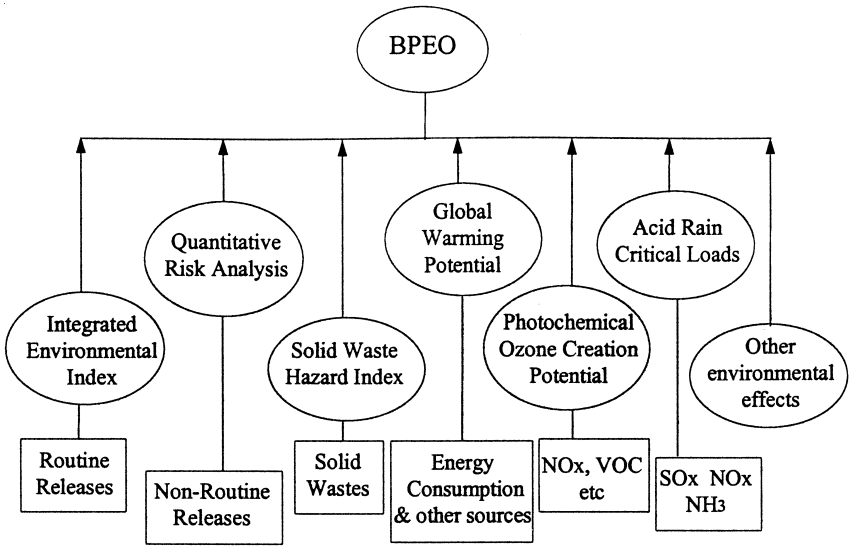

Fig. 5. BPEO assessment framework.

and compare long-term effects from routine releases, the Hazardous Waste Index can be used to compare solid waste arisings, etc. Other environmental effects may include depletion of non-renewable resources, land take and associated transport. There is still substantial debate on the validity of such approaches, but they have been demonstrated to be of practical value in real cases. The key issue remaining is how to integrate or compare the different categories of harm, and then to compare overall environmental harm with other basic factors such as safety, technical feasibility, economics and public perceptions. This may be required in a full BPEO assessment, unless the BPEO can be identified readily by qualitative comparisons. There are examples of integrated assessments, but there is some way to go before they are established.

3. Risk assessment and goal-setting in environmental legislation

It is proposed that a risk-based goal-setting approach to environmental legislation and regulation is a logical reflection of current legislative, regulatory and industry thinking, which builds on developments by the regulator such as those presented above, and actions taken by industry such as voluntary programmes (e.g. Responsible Care and Eco-Management and Audit Scheme, EMAS (Environmental Management Assessment Systems)), risk management activities and waste management initiatives. The aim is to achieve the greatest environmental benefit at lowest overall cost.

The risk-based approach is already applied to certain aspects of safety management of offshore installations within the Safety Case regulations introduced following the Cullen Inquiry into the Piper Alpha disaster of 1988. This may be extended to include environmental considerations offshore, given that the DTI (Department of Trade and

Industry) intends to apply the EU Directive on assessing the effects of certain public and private projects on the environment [8] to the UK offshore industry. This may require offshore operators to produce an Environmental Case providing a cradle to grave account of the environmental effects from their oil and gas operations. DTI and UKOOA (United Kingdom Offshore Operators Association) are currently discussing the likely content and details of the Environmental Case, and UKOOA is exploring the use of environmental risk assessment for offshore operations, for example in relation to oil spill risk management. Onshore, Environmental Cases for industrial processes are likely to be the most effective way to deal with the forthcoming COMAH (Control of Major Accidents and Hazards) and IPPC (Integrated Pollution Prevention and Control) Regulations. These may be integrated with Safety Cases where appropriate under the COMAH Regulations. What are the characteristics of a risk-based goal-setting approach to environmental legislation? These are summarised in Appendix B and discussed below.

The organisation's policy is towards environmental performance rather than pure compliance with regulations; high environmental performance, in terms of minimising waste and controlling risks, has a beneficial effect on company financial performance. This provides the most effective means of driving environmental protection. As the recent Business in the Environment, Index of Corporate Environmental Engagement [9] indicates, organisations are realising that they need to proactively manage their environmental affairs as an integral part of their business processes, and this requires high-level commitment, policy, goals and management systems.

Environmental performance is driven by environmental assessments and environmental management systems: the risk-based approach can include a range of assessment activities, e.g. Life-Cycle Analysis of products, BPEO assessment of process options, risk assessment of accidental releases, assessment of landuse for new developments, waste minimisation assessments, etc. These assessment activities should themselves link together, and form an integral part of the organisation's overall environmental management systems. Consideration of costs and benefits needs to be embedded in the assessment process, in order to demonstrate that environmental improvements are not placing unacceptable financial burdens. Assessments should be as integrated as possible, i.e. all relevant environmental issues are considered together and along with safety considerations where necessary. The main uncertainties should be identified and how decision-making has taken these into account should be demonstrated. In particular, the assessments should show how long-term uncertainties have been resolved.

Priorities and goals are based on a systematic consideration of the risks, costs and benefits, national and international commitments, etc. Goal-setting is by mutual agreement between the regulator and operator for defining and implementing strategies aimed at improving environmental performance to agreed levels. Management performance and risk to the environment should be in balance, but where this is not achieved, regulation can make up the difference. Regulation should act as a safety net to prevent companies falling below the minimum standards necessary to avoid intolerable risks, and to encourage continuous improvement. The extent of regulation reflects the degree of risk demonstrable by operators, i.e. regulatory authorities recognise the reduction in risk achieved by operators committed to environmental management. This can be reflected in the focus of regulatory inspections and independent monitoring and by other means.

Discussions between operator and regulator, and resulting decisions, are open and auditable to enable the close and responsive relationships, which the Agency is now required to form with industry and other parties, to be developed without raising concerns about a 'cosy relationship' or compromise of the Agency's independence.

4. Industry's role in this process

From the above discussion, industry's role in the process of further developing a risk-based goal-setting approach may be defined in terms of a number of key activities:

- collaboration on development of assessment methodologies and data gathering exercises;
- consultation on development of standards and acceptance criteria;
- setting of corporate strategies, objectives and targets taking into account risks, costs and benefits;
- use of Environmental Management Systems concepts to drive improvement and compliance;
- submission of environmental and economic assessments for independent review by the regulator;
- decision-making based on a transparent consideration of risks;
- communication to company staff of the risks and corporate objectives relating to these;
- disclosure of relevant information to the public domain.

The Environment Agency plays a leading role in developing environmental assessment techniques which may be for internal or external use. The methods are widely publicised and consulted on, so that the final products are transparent and have a degree of consensus built into them. This provides a model for the collaboration required to develop the basis for environmental cases. Traditionally, industry has collaborated in developing analysis methods and data, and the regulator has developed assessment criteria and standards. This division of responsibility may need to shift towards a greater degree of collaboration from industry. The Environmental Analysis Cooperative, initiated by HMIP in 1994 and now involving a range of industry, regulators and other groups, is an example of collaboration between regulators and industry.

Operators may be able to use methods similar to the Agency Strategic Risk Assessment methodology for performing structured and systematic evaluations of environmental risks, costs and benefits at a strategic level, to ensure that corporate objectives and targets are consistent and reflect these parameters. This would be part of the systematic approach built into Environmental Management Systems, e.g., a register of significant environmental effects and corresponding critical environmental safeguards. Operators should use environmental assessments for specific processes and projects to demonstrate that they are using BATNEEC/BPEO for their processes and have minimised the risks to an acceptable level. These should be consistent with the corporate policy and objectives relating to environmental performance. The regulator should then be in a position to independently review submissions using the agreed assessment methods and criteria as a reference. The discussions can then focus on the results and the

appropriate risk management measures, rather than the methodology used. The operator should disclose relevant environmental information to the public domain, in order to allow independent inspection and to encourage public confidence. Company environmental reports, data on environmental effects and specific applications can contribute towards this.

5. Benefits and limitations of the risk-based goal setting approach

The potential benefits of the risk-based goal setting approach are as follows:

- cost-effective targeting of risk management resources towards high risks;
- predict and manage legislative, environmental, economic and public pressures;
- more explicit treatment and better management of uncertainties;
- flexibility in setting and applying criteria and standards;
- reduced risk of non-compliance with environmental regulations and standards;
- improved efficiency of assessments and submissions under different regulatory regimes.

Under a risk-based approach, both the regulator and operator should be able to target limited resources towards the most important risks, and in a way which is complimentary, i.e. the regulator's risk management resources more closely fit the gaps and limitations of the operator's risk management resources. Companies which have formed their environmental strategies based on consideration of all types of risk, including public and legislative pressures, will be more able to predict and plan for their effects on the business, making their own business planning more robust and able to deal with future requirements. If agreed methodologies and criteria can be put in place, the operator should be in a better position to determine what is likely to be acceptable to the regulator and public, removing some of the uncertainty in planning future projects.

Traditional approaches to environmental regulation are often based on fixed standards which may be applied uniformly over a wide range of conditions and cases. This may on occasion result in under- or over-regulation of activities. A risk-based approach to standards should enable a more targeted and effective approach by both allowing standards to vary according to specific conditions, and replacing the single-value criteria with banded or 'fuzzy' criteria, where appropriate. This should avoid unnecessary environmental protection burdens and ensure costs and benefits are considered in applying criteria on a case-by-case basis.

Non-compliance with regulations and standards on existing processes can be disruptive to the business and consume substantial regulatory resources. A risk-based approach should reduce the risk of non-compliance incidents causing significant problems, for example by identifying the potential causes and criticality of exceedance of each regulation/standard, and designing the process systems to reduce the chances of critical exceedance incidents occurring.

Environmental assessments carried out for different purposes (e.g. Environmental Impact Assessments for landuse planning, BPEO and environmental analysis for IPC authorizations and risk assessment for COMAH/CIMAH (Control of Industrial Major Accident Hazards) regulations) may be conducted using a simplified assessment frame-

work, so that common data and assessment exercises may be employed for different regulatory requirements. In addition, the data gathered and used within the company's own environmental management system should be consistent with regulatory requirements.

Limitations in the current abilities of risk assessment and environmental management which need to be overcome to fully exploit these benefits are as follows.

- There are significant limits to the availability of data and understanding of environmental processes and pathways, and effects of polluting substances and other human interventions, especially over the long-term.
- There is limited agreement on how to add or compare different environmental effects on a common basis. Given the inherent difficulties in comparing different types of environmental risk, a flexible, pragmatic and iterative approach must be taken in developing and applying assessment methods, so that individual case-specific issues may be accommodated and concerns about prescriptive methodologies reduced.
- Certain policy issues remain unresolved, e.g. the basis for trading off or comparing safety, environmental and economic factors, and the basis for setting environmental risk acceptance criteria.
- Methods for costing environmental damage and valuation of environmental resources exist but how they should be used has not been fully established.
- Methods for combining scientific, economic and public/political factors in a systematic way for decision-making purposes need to be further developed and applied to real problems to test their utility. Should we deal with scientifically identified risk, or public perception of risks? What is the appropriate balance between these, and how do we convey decisions which appear to run against public perceptions of risk?
- Ways to communicate risk information, both transferring expertise and presenting results, need to be improved within and outside the regulator.
- The links between environmental assessment, risk assessment and economic assessment and their relationship to sustainable development need to be further explored and the meaning and use of the terms more widely agreed. In particular, further work may be needed to reach a common understanding of risk assessment, its terms and uses, given the wide range of current practices which qualify as 'risk assessment'.

6. A way forward

Changes in safety legislation have sometimes arisen as a result of major disasters (e.g. Flixborough and Piper Alpha), where substantial changes were rapidly made as a reaction to these incidents. By comparison, developments in environmental protection and legislation tend to follow a more evolutionary process, due in part to the fact that many environmental concerns are long-term (e.g. acid rain, water quality), and the environmental disasters which have occurred (e.g. Sea Empress) have not yet resulted in sudden major changes to legislation. Thus, a risk-based approach to environmental legislation may have a long way to go to fruition, but many of the foundations are in reality already in place. The potential value of this approach is great, given the

sometimes very high costs of getting environmental protection wrong, and conversely, the high benefits and opportunities that may be realised by getting it right.

It is important that risk and other assessment techniques and results are integrated into the environmental management systems of the operator, as these systems have a significant effect on the risk levels, the chances of detection of risks early on, and the way in which an operator might act in the event of an incident or problem occurring. A few possible steps towards further development of the risk-based approach are discussed below.

1. Methods for measuring environmental risk and environmental performance, in relation to all types of environmental effect, should be agreed and used in a consistent fashion across the business from strategic considerations to specific projects. Mechanisms for setting goals/targets based on these measures should be made explicit and agreed.

2. Operators and the regulator should agree on assessment methods to be used, and how information is to be provided to the public. The Agency will continue to support collaborative groups such as the Environmental Analysis Cooperative.

3. The basis for defining regulatory criteria and standards should be clarified and a mechanism introduced for redefining criteria or defining new criteria as appropriate.

4. Operators should use regulatory submissions to demonstrate that they have adequately identified, assessed and protected against risks to the environment as a whole, arising from all aspects of their business.

5. The regulator should be able to give appropriate credit for company initiatives to improve environmental performance, e.g. in the degree of inspection effort required, reporting requirements, etc.

6. A predictive capability should be developed by operators and the regulators, whereby a range of systems may be used which attempt to identify environmental risks at an early stage, enabling the Agency and industry to take a proactive approach to environmental protection.

7. A national centre of expertise is being set up by the Environment Agency to develop and provide risk assessment capabilities for environmental protection.

8. The Agency intends to further deploy environmental risk concepts where appropriate in its routine work, conducting research and development where needed and publicising environmental risk assessment concepts and applications.

Appendix A. Aims and objectives of environment agency

> It shall be the principal aim of the Agency . . . (taking into account costs) . . . to protect or enhance the environment, taken as a whole, as to make the contribution towards attaining the objective of achieving sustainable development.
>
> The Agency's pollution control powers shall be exercisable for the purposes of preventing or minimising, or remedying or mitigating the effects of, pollution to the environment.

The Agency shall, for the purpose ... of enabling it to form an opinion of the general state of pollution of the environment, compile information relating to such pollution ...

... the Agency shall carry out assessments (whether generally or for such particular purpose as may be specified in the requirement) of the effect, or likely effect, on the environment of existing or potential levels of pollution ... and prepare a report identifying the options which the Agency considers to be available for preventing or minimising, or remedying or mitigating the effects of, pollution of the environment ... and the costs and benefits of such options ...

It shall be the duty of the Agency, to such extent as it considers desirable, generally to promote—the conservation and enhancement of the natural beauty and amenity of inland and coastal waters and of land associated with such waters; the conservation of flora and fauna which are dependent on an aquatic environment; and the use of such waters and land for recreational purposes ...

It shall be the duty of the Agency to take all such action ... necessary for the purpose of conserving, redistributing or otherwise augmenting water resources ...

... the Agency shall ... exercise a general supervision over all matters relating to flood defence.

It shall be the duty of the Agency to maintain, improve and develop ... fisheries.

It shall be the duty of ... the Agency, in formulating or considering any proposals ... to have regard to the desirability of conserving and enhancing natural beauty ... flora, fauna and geological or physiographical features ... buildings, sites and objects ... beauty or amenity of any rural or urban area ... economic and social well-being of local communities ...

Each new Agency ... shall ... take into account the likely costs and benefits of the exercise or non-exercise of the power or its exercise in the manner in question.

Appendix B. Characteristics of the risk-based goal-setting approach to environmental legislation

1. The organisation's policy is towards environmental performance rather than pure compliance
2. Environmental performance is driven by environmental assessments and environmental management systems
3. Priorities and goals are based on a systematic consideration of the risks, costs and benefits

4. Management performance and risk to the environment should be in balance
5. Regulation should act as a safety net to prevent intolerable risks and provide a consistent baseline
6. The extent of regulation reflects the degree of risk demonstrable by operators
7. Discussions between operator and regulator, and resulting decisions, are open and auditable
8. The legislative regime reflects the principles that 'the polluter pays', and also 'pollution prevention pays'

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